UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/665,405	09/22/2003	Noritaka Miyamoto	Q77593	4397

23373 7590 06/03/2005

SUGHRUE MION, PLLC
2100 PENNSYLVANIA AVENUE, N.W.
SUITE 800
WASHINGTON, DC 20037

EXAMINER	
DINH, TUAN T	

ART UNIT	PAPER NUMBER
2841	

DATE MAILED: 06/03/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/665,405	MIYAMOTO ET AL.	
	Examiner	Art Unit	
	Tuan T. Dinh	2841	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *22 September 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-6* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,5 and 6* is/are rejected.

7)☒ Claim(s) *2-4* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *17 February 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *09/22/03*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Objections

1. Claims 1, 4, and 6 are objected to because of the following informalities:

Claim 1, line 9, "a board" should be - - the board - - for proper antecedence basis.

Claim 1, line 9, "the main surface" should be - - a main surface - - for proper antecedence basis.

Claim 4, line 3, "the solder layer" should be - - a solder layer - - for proper antecedence basis.

Claim 4, lines 3-4, it is unclear. The phrase of "the formed thickness of the solder layer formed on the basis of the soldering is adjusted to be not greater than 0.3" is confuse and not understood. Does applicant means of "the thickness of a solder layer is adjust to be not greater than 0.3?"

Examiner assumes that claim 4, lines 3-4 should be read - - the thickness of a solder layer is adjusted to be not greater than 0.3 - -.

Claim 6, line 4, "the solder layer" should be - - a solder layer - - for proper antecedence basis.

Appropriate correction is required.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1 and 6 are rejected under 35 U.S.C. 102(e) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Wang et al. (U.S. Patent 6,448,106).

Regarding claim 1, Wang et al. discloses a circuit board (33, column 4, line 28) made of resin with pins (32, column 5, line 35) as shown in figures 3-4(a), comprising:

flat pins (32) each including;

a rod portion (32b-figure 4a, see column 5, line 55) having a diameter of not greater than 0.35 mm (or S< 0.35 mm) (d of about 200 microns (0.2 mm) or less, or d = 0.0-0.2 mm), see column 6, line 1), and

a concentric tabular large diameter portion (a head pin 32a, see column 5, line 54) having a larger diameter than that of the rod portion (D of about 800 microns or less, or D = 0.0-0.8 mm), see column 6, line 2) formed on one end of the rod portion (32b),

the flat pins (32) each being soldered to a pin bonding portion (see column 5, lines 37-40) provided on a main surface of the board at the large diameter portion (32a),

Wang et al. disclose the diameter of the enlarged portion to be 0.8 mm or less and the diameter of the rod portion to be 0.2mm or less. As such, Wang et al. disclose a range of available values for each of the diameters, many of which will yield the

desired ratio. For example, if the rod diameter is 0.2 mm and the large diameter is 0.5 mm, the resulting ratio is 2.5, which is in the claimed range.

So, for a rod diameter of 0.2mm, approximately 13% of the permissible large diameter values would yield a ratio in the claimed range (rod diameter 0.2mm, then the large diameter portion must be .432 to 0.534. Therefore, the permissible range of large diameters is 0.534-0.432 = .102 mm. 0.102mm/0.8mm = 12.75%.)

Therefore, the selection of the diameter's values of Wang results in a range of ratio, which overlaps the claimed range of 2.16 to 2.67.

MPEP 2131.03 states

PRIOR ART WHICH TEACHES A RANGE WITHIN, OVERLAPPING, OR TOUCHING THE CLAIMED RANGE ANTICIPATES IF THE PRIOR ART RANGE DISCLOSES THE CLAIMED RANGE WITH "SUFFICIENT SPECIFICITY"

When the prior art discloses a range which touches, overlaps or is within the claimed range, but no specific examples falling within the claimed range are disclosed, a case by case determination must be made as to anticipation. In order to anticipate the claims, the claimed subject matter must be disclosed in the reference with "sufficient specificity to constitute an anticipation under the statute." What constitutes a "sufficient specificity" is fact dependent. If the claims are directed to a narrow range, the reference teaches a broad range, and there is evidence of unexpected results within the claimed narrow range, depending on the other facts of the case, it may be reasonable to conclude that the narrow range is not disclosed with "sufficient specificity" to constitute an anticipation of the claims. The unexpected results may also render the claims unobvious. The question of "sufficient specificity" is similar to that of "clearly envisaging" a species from a generic teaching. See MPEP § 2131.02. A 35 U.S.C. 102 /103 combination rejection is permitted if it is unclear if the reference teaches the range with "sufficient specificity." The examiner must, in this case, provide reasons for anticipation as well as a motivational statement regarding obviousness. Ex parte Lee>,< 31 USPQ2d 1105 (Bd. Pat. App. & Inter. 1993) (expanded Board). For a discussion of the obviousness of ranges see MPEP § 2144.05.

Since many of the diameter combinations disclosed by Wang et al. fall in the claimed range and since there is no evidence of unexpected results, examiner concludes that the prior art has "sufficient specificity" to anticipate the range.

Even if the range does not anticipated, one of ordinary skill in the art, at the time of the invention, would have found it obvious to choose the values of diameter resulting

in the claimed ratios so as to provide an anchor for the rod which is stable but does not consume too much board space.

Further, it has been held that where the general conditions of a claim are disclosed in the prior art, finding an optimum or workable range is within the level of ordinary skill. In re Antonie, 559 F.2d 618 (CCPA 1977). Variations in the distance would have been obvious minor adjustments without patentable significance. See In re Aller, 105 USPQ 233 (CCPA 1955) (Where general conditions of the claim are disclosed in the prior art, it is not inventive to discover optimal or workable ranges by routine experimentation).

Regarding claim 6, Wang et al. discloses a top portion of the concentric tabular larger diameter portion is exposed from a solder layer, see column 5, lines 35-45, the pins is bonded to the conductive region/layer (not shown) by a solder, so that the solder is provided the distance between the pin and the conductive region. Thus, the pin is exposed from the solder to the conductive region.

4. Claims 1, and 5-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shiraishi (U.S. Patent 6,359,332) in view of Wang et al. (U.S. Patent 6,448,106).

As to claim 1, Shiraishi discloses a circuit board (printed wiring substrate100 includes epoxy resin substrate 101, column 4, lines 60-61) as shown in figures 1-4 made of resin with pins (121, column 5, line 27), the pin (121) comprising:

a rod portion (122) having a diameter of not greater than 0.35 mm (or S< 0.35 mm), the diameter of the rod portion (122) is 0.3 mm, see column 5, lines 29-31 , and

a concentric tabular large diameter portion (a flange pin 123) having a larger diameter than that of the rod portion (the diameter of the flange is 0.7 mm) formed on one end of the rod portion (32b),

the pins (121) each being soldered (131) to a pin bonding portion (111) provided on the main surface of the board at the large diameter portion (123), see column 5, lines 34-39,

wherein the ratio (W/S) of the diameter of the large diameter portion to the rod portion from not smaller than 2.16 to not greater than 2.67 ($2.16<W/S<2.67$), if the diameter of the rod portion and the large diameter portion of the flat pin are S and W, respectively (the diameter of the larger diameter portion of Shiraishi is 0.7 mm, and the diameter of the rod portion of Shiraishi is 0.3 mm, and $0.7/0.3 = 2.5$. Thus the result is 2.5 that meets in a range of 2.16-2.67).

Shiraishi does not disclose the pin is flat. However, Wang et al. teaches a resin board (33) as shown in figures 3 through 4a comprising a flat pin (32).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made have a flat pin as taught by Wang et al. employed in the circuit board of Shiraishi because the flat pin, having a flat head, is easy to make connection of the pin to the board or substrate.

As to claim 5, Shiraishi discloses the pins (121) are each made of a metal material containing at least copper, see column 3, lines 27-28.

As to claim 6, Shiraishi discloses a top potion the concentric tabular large diameter portion is exposed from the solder layer.

5. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wang et al. (U.S. Patent 6,448,106) in view of Shiraishi (U.S. Patent 6,359,332).

Regarding claim 5, Wang et al. does not explicitly disclose the pin made of metal containing at least a copper. Shiraishi teaches a pin (121) made of metal containing at least a copper, see column 5, lines 27-28.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to utilize a pin made of metal and containing at least a copper as taught by Shiraishi, modified the pin of Wang et al. because the pin made of metal and containing at least a copper that is provided a better conductivity, and low cost for manufacture.

Allowable Subject Matter

6. Claims 2-4 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The references cited do not disclose or render obvious in combination of the flat pin including the ratio (T/S) of the thickness of the large diameter portion to the diameter of the rod portion is in a range of 0.4-0.67 (recited in claim 2), or 0.4-0.54 (recited in claim 3), and the thickness of a solder layer is adjusted to be not greater than 0.3 mm along the vertical direction from a first main surface of a pin bonding portion toward the flat pin (recited in claim 4).

Conclusion

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Currie, Tsukamoto, Moriizumi et al., Kimura et al., and Saiki et al. disclose related art.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tuan T. Dinh whose telephone number is 571-272-1929. The examiner can normally be reached on M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kammie Cuneo can be reached on 571-272-1957. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Tuan Dinh
May 13, 2005.